TIII:

Multivibrators

Unclassified

4 Hour Conference, W/ 5 Hr PE1

Safety & Environmental Impact is “LOW”

TIII: MULTIVIBRATORS

Terminal Learning Objective

ACTION:

Given schematic diagrams & Ckt operational concepts of the Astable, Monostable, & Bistable Multivibrator answer all Questions

CONDITION: W/O Reference.

STANDARD: A minimum accuracy of 70%.

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Introduction

You have covered two types of Ckts in this block thus far, the Sinewave & Blocking Oscillators, each w/ there own distinctive outputs. The Third type of Ckt covered will be 3 different multivibrator, each is similar but distinctively different, and in their peculiarity is suited for a specific application in a circuit.

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Creature Features: 3 Different Types

1. **Astable**; {PC 44}, No Stable State, Free Running.

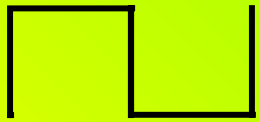
   Output; Symmetrical or Asymmetrical Square waves.

2. **Mono Stable**; {PC 46}, 1 Stable State, Q5 C/O, Q6 Sat. Triggered.

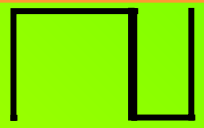
   Output; Frequency In = Frequency Out.

3. **Bi Stable**; {PC 45}, 2 Stable States, Q3 C/O, Q4 Sat or Q3 Sat, Q4 C/O.

   Output; is ½ of the Input. Triggered.



Symmetrical



Asymmetrical

Astable Ckt

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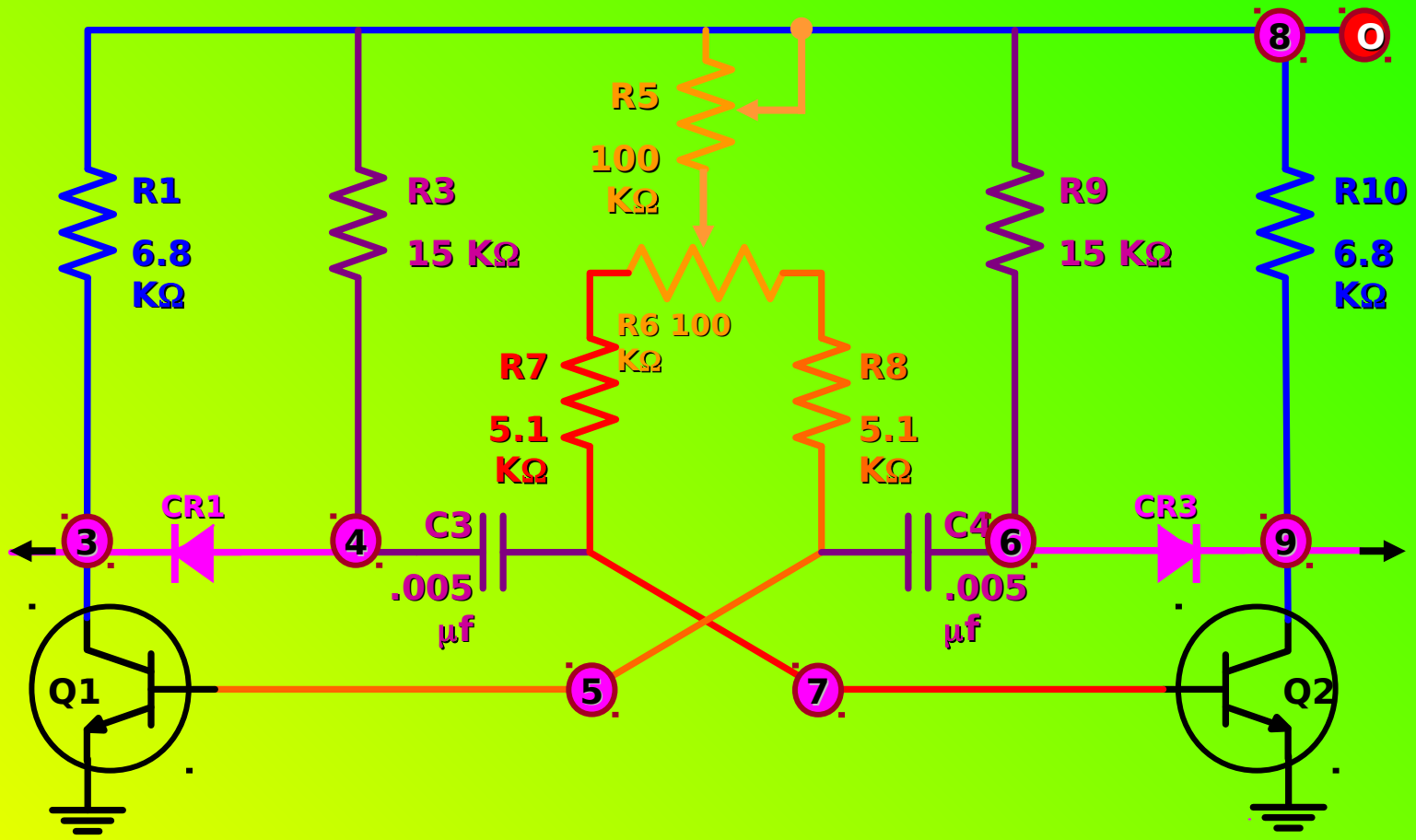
Astable PC44: Circuits & Components



Charge & Discharge

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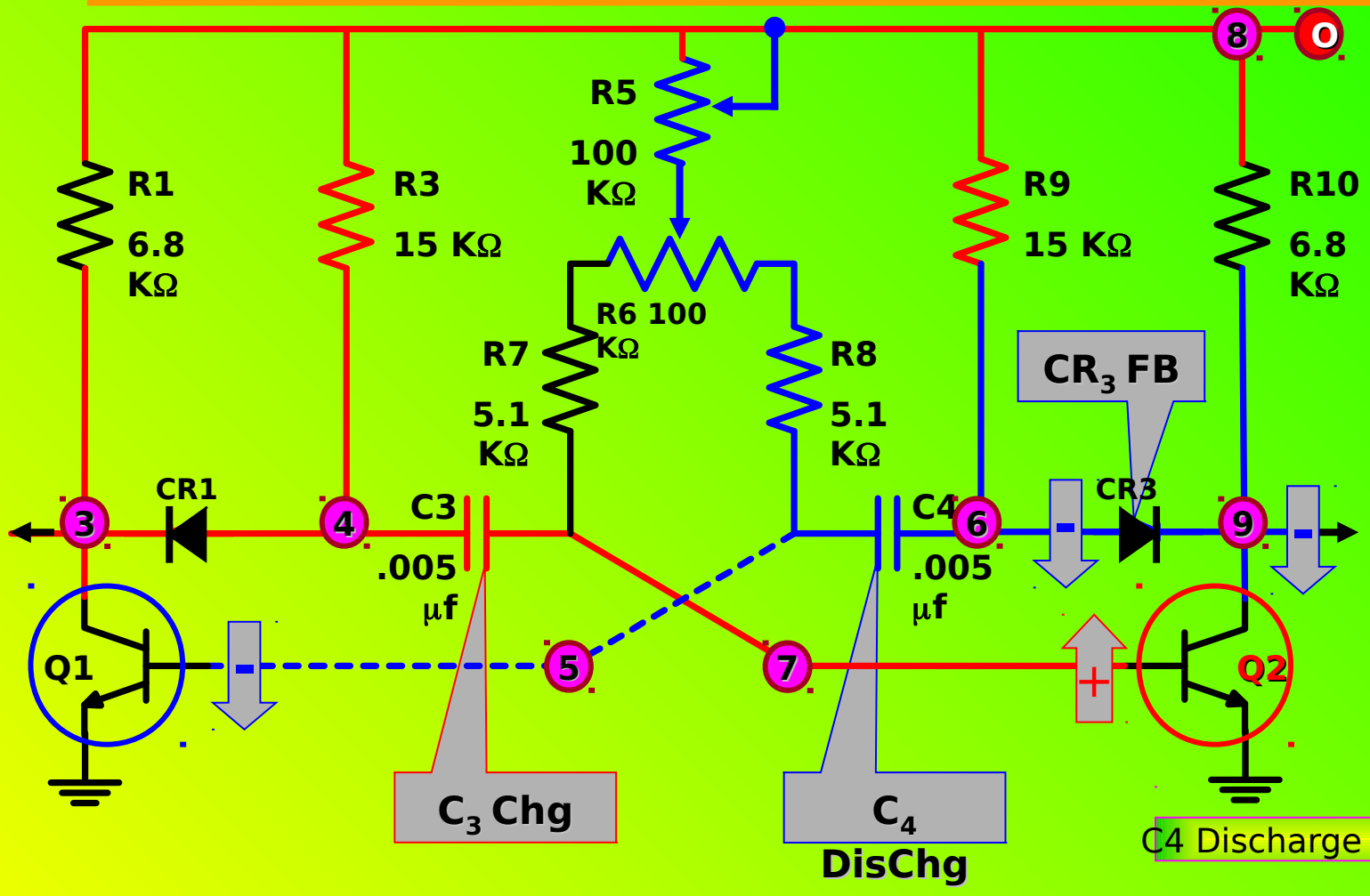
Astable PC44: Q_2 on, C_3 Charge, C_4 Discharge, Q_1 C/O.



C4 Discharge Symmetry

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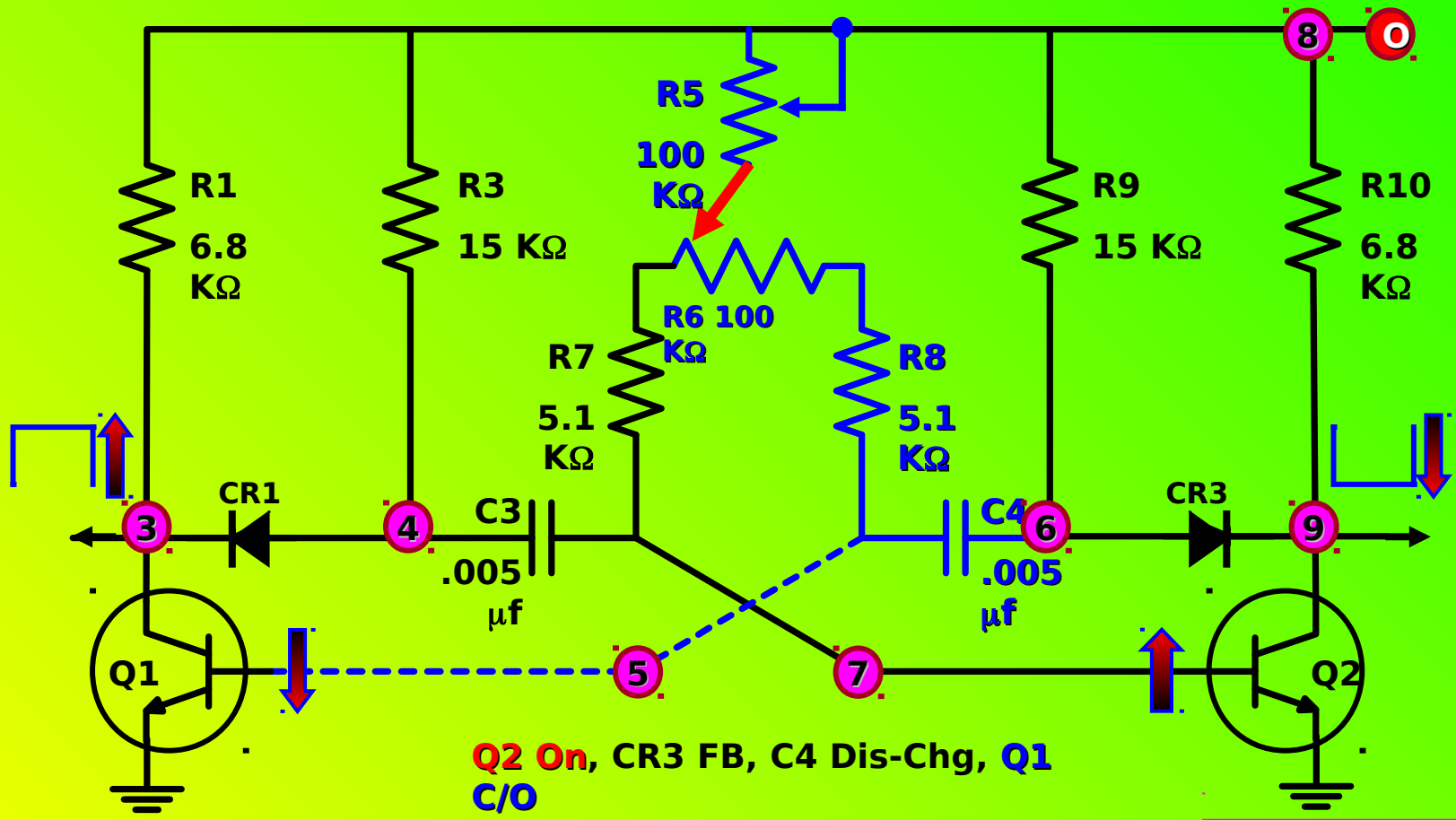
Astable PC44: Symmetry control, C4 Discharge.



C3 Discharge Symmetry

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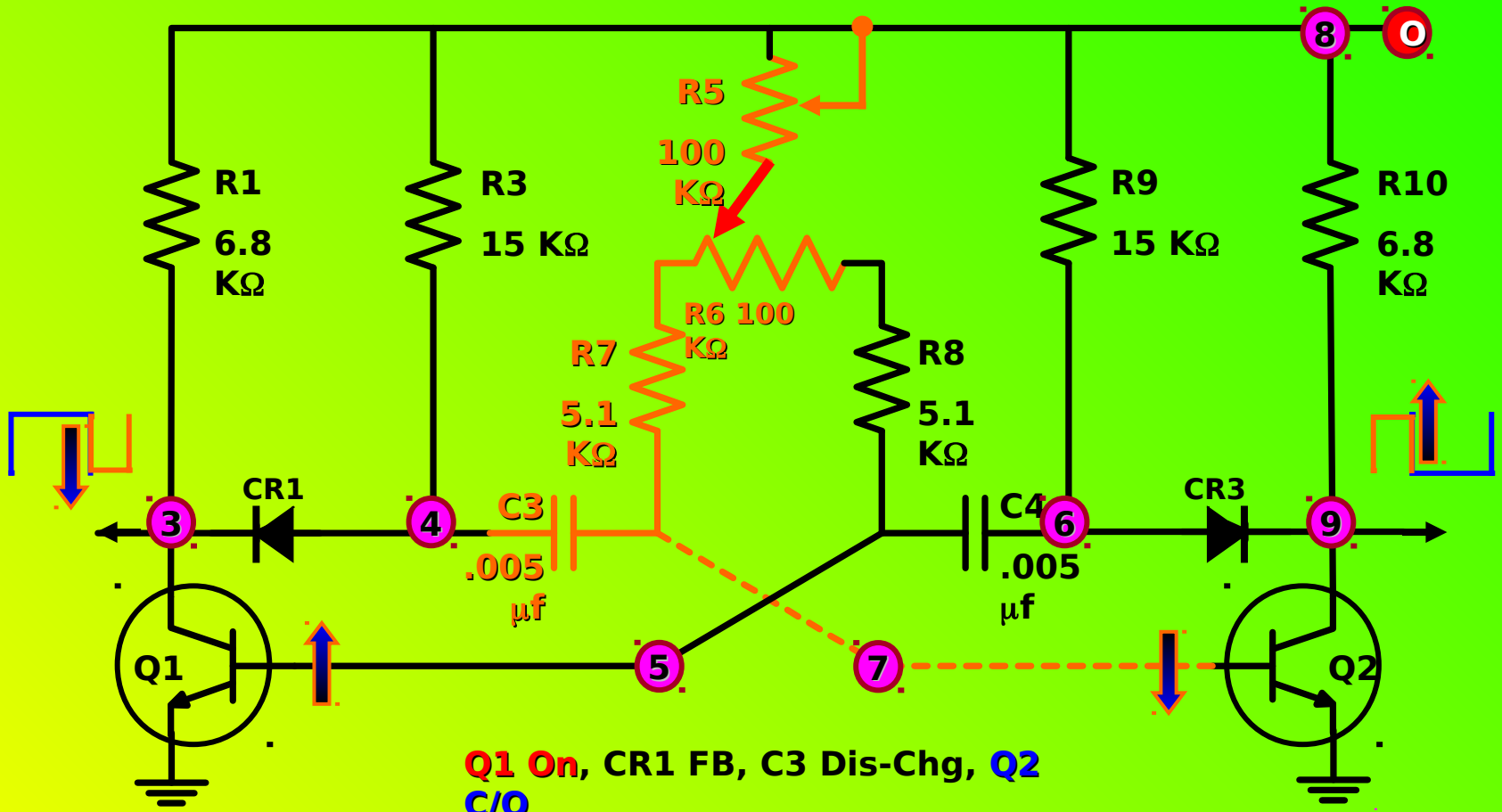
Astable PC44: Symmetry control, C3 Discharge.



Wave Form

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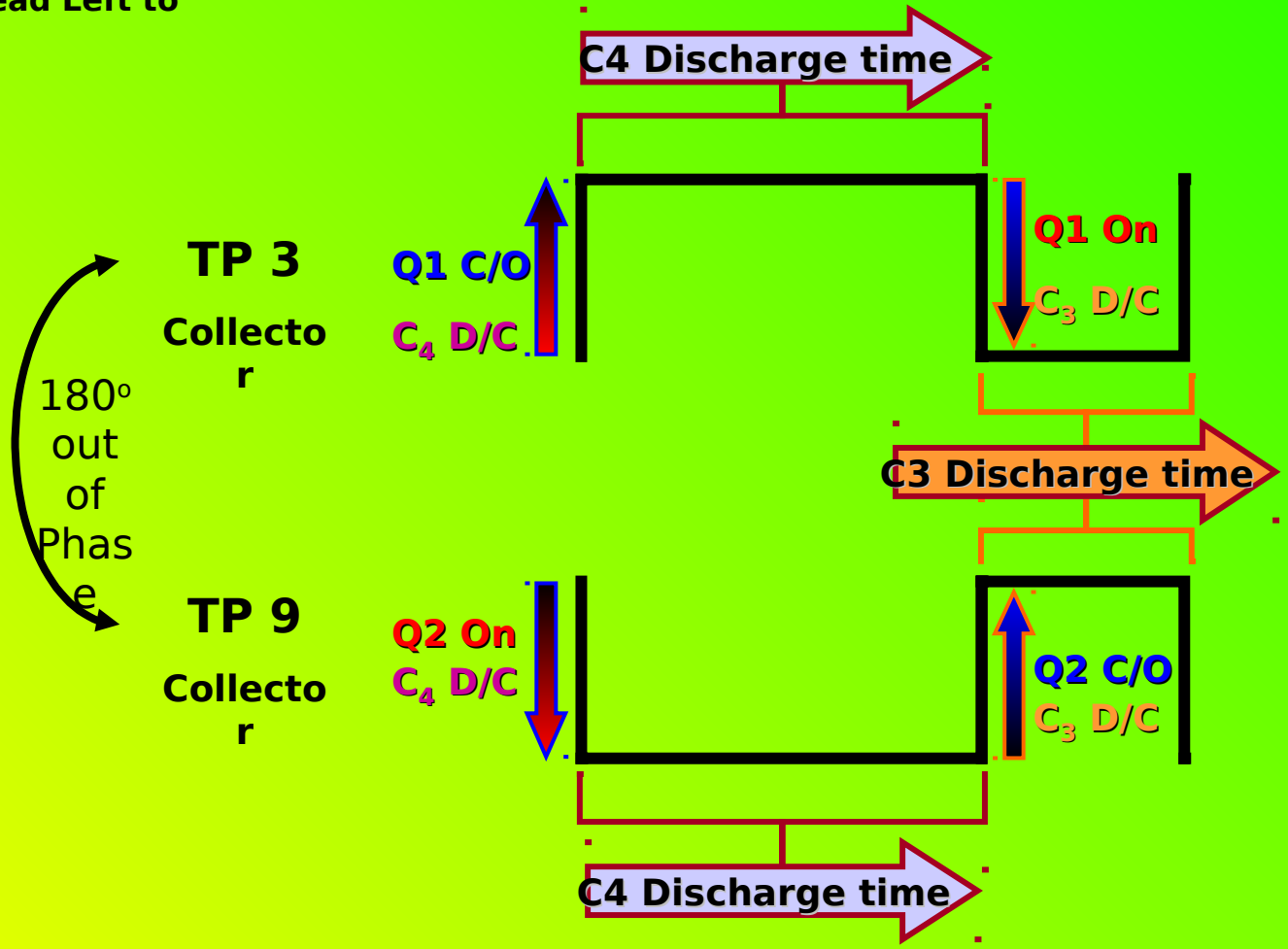
Astable PC44: Wave Form Analysis @ TP 3 & 9

NOTE: Read Left to right



Mono Stable

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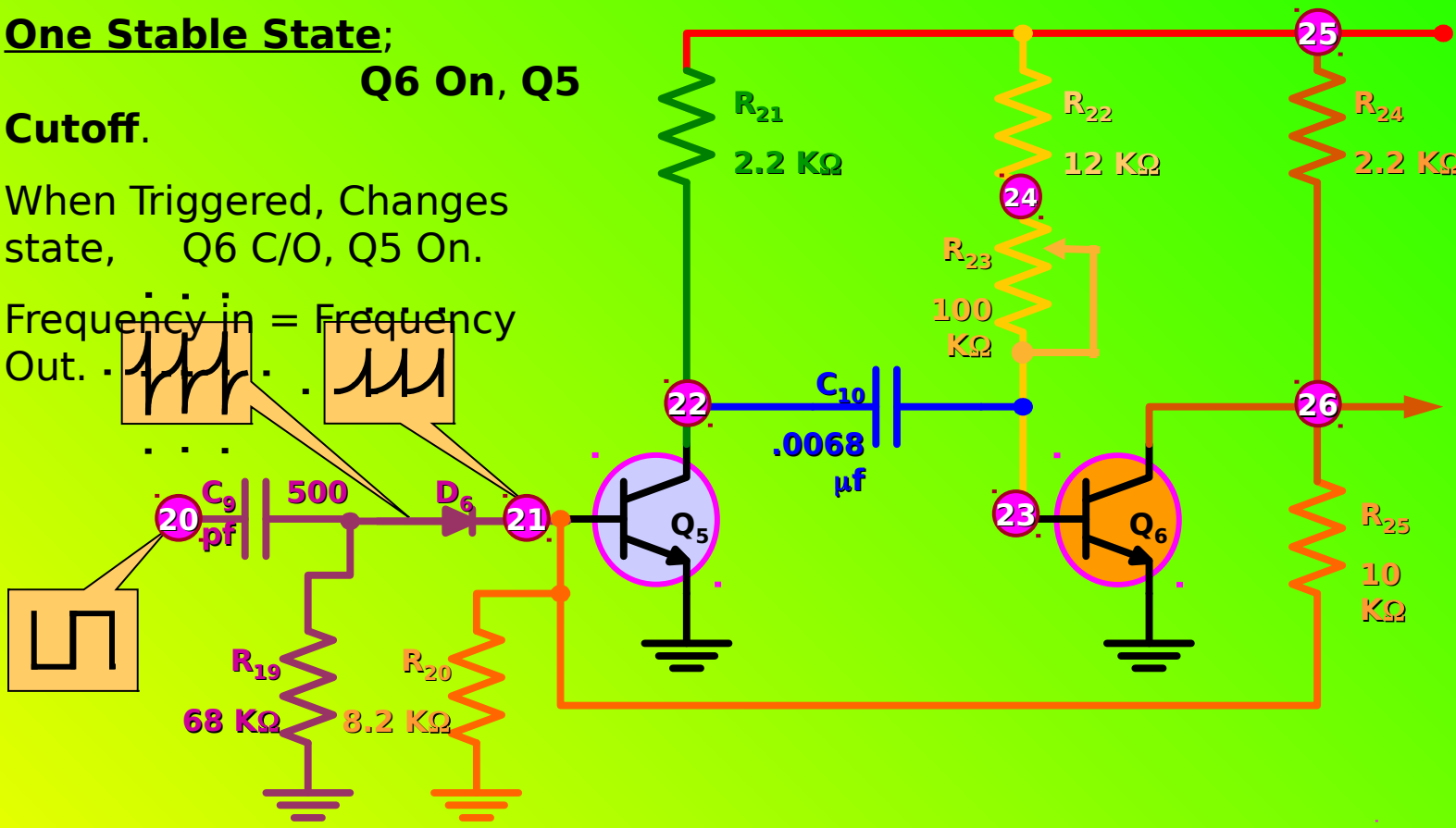
Mono Stable PC46: Circuits & Components

<u>One Stable State</u>;

Q6 On, Q5 Cutoff.

When Triggered, Changes state, Q6 C/O, Q5 On.

Frequency in = Frequency Out.



Ops

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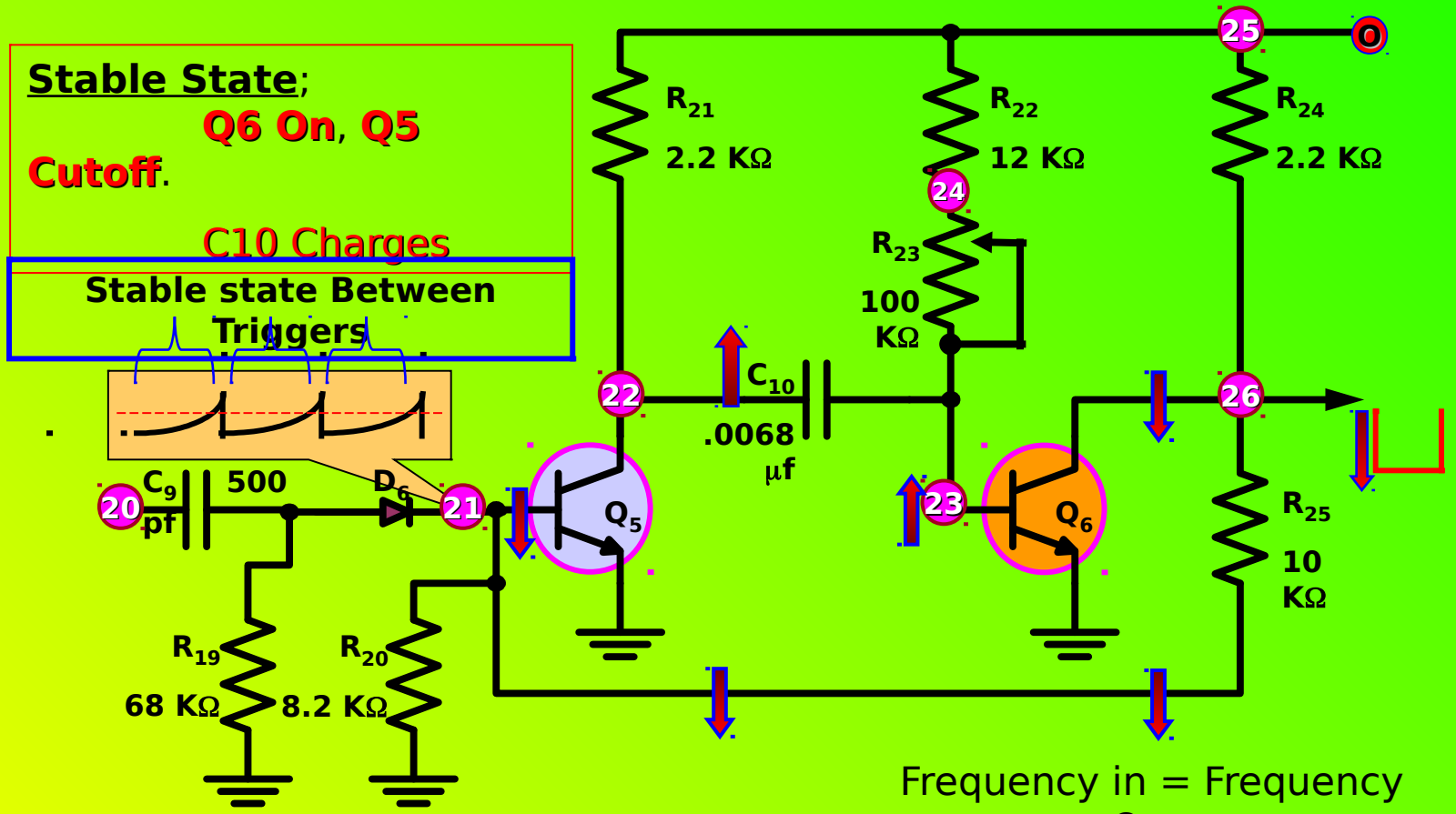
Mono Stable PC46: Ops, Stable State.

Stable State;

Q6 On, Q5 Cutoff.

C10 Charges

Stable state Between Triggers



Frequency in = Frequency Out.

Triggered

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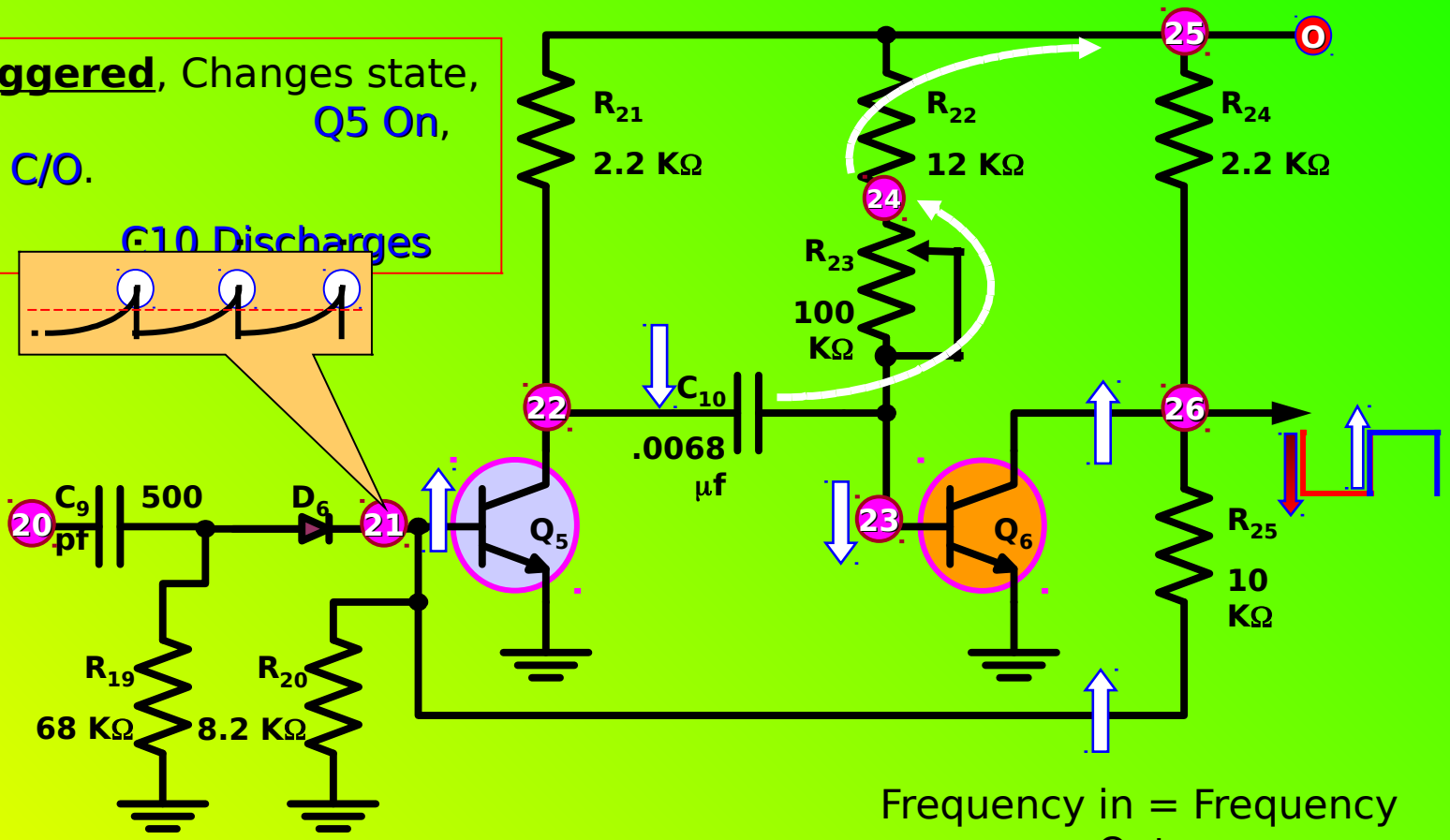
Mono Stable PC46: Ops, Triggered.

Triggered, Changes state,
Q5 On,
Q6 C/O.
C10 Discharges



Frequency in = Frequency Out.

Bi Stable

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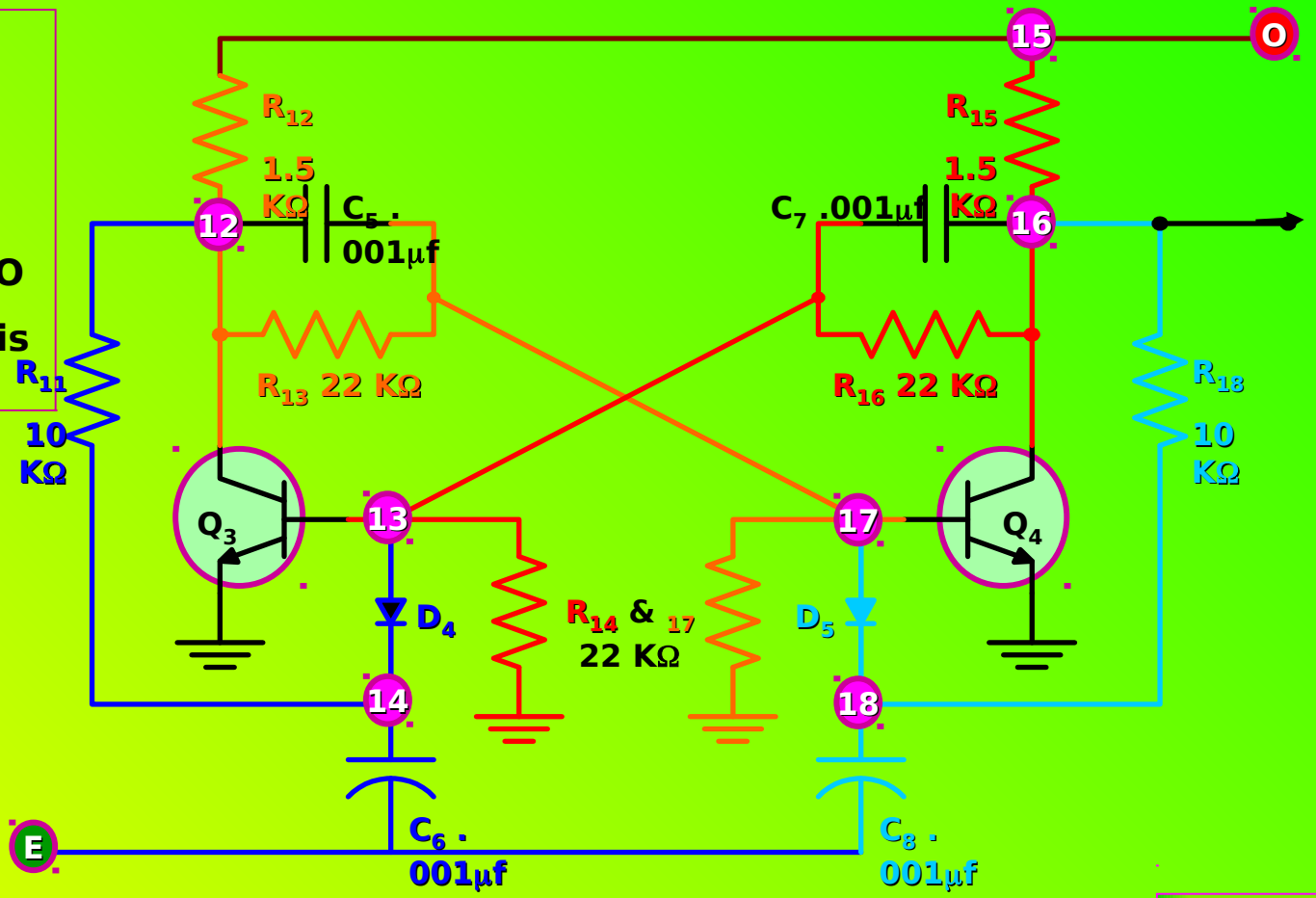
Bi Stable PC45: Circuits & Components.

2 Stable States;

Q3 On, Q4 C/O

Or **Q4 On, Q3 C/O**

Frequency Out is ½ the Input.



Ops Q3 on

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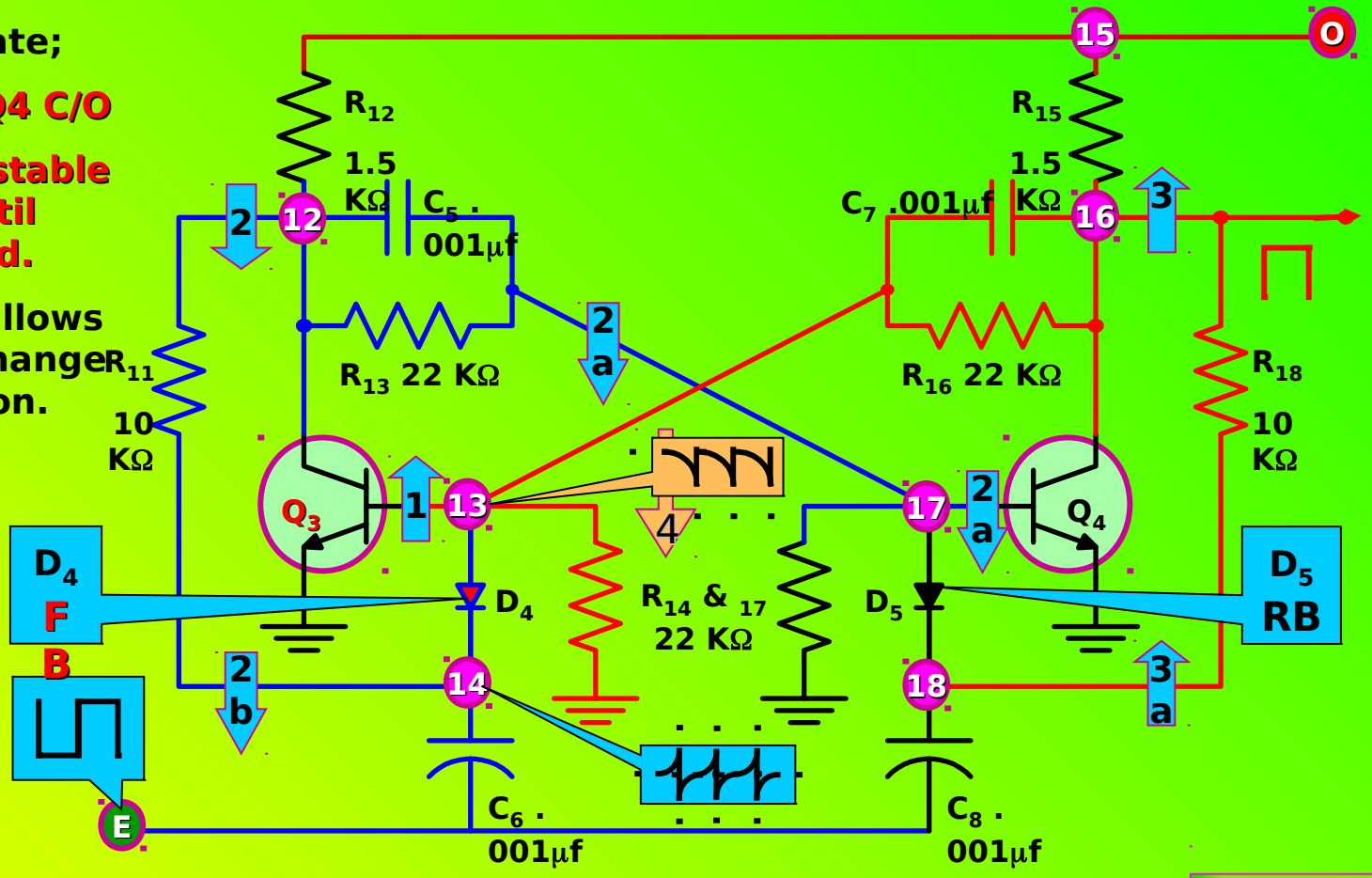
Bi Stable PC45: Ops, Q3 on Q4 off.

Stable State;

Q3 On, Q4 C/O

Remains in stable state until triggered.

D4 FB allows trigger to change conduction.



Frequency Out is ½ the Input.

Q3 off Q4 on

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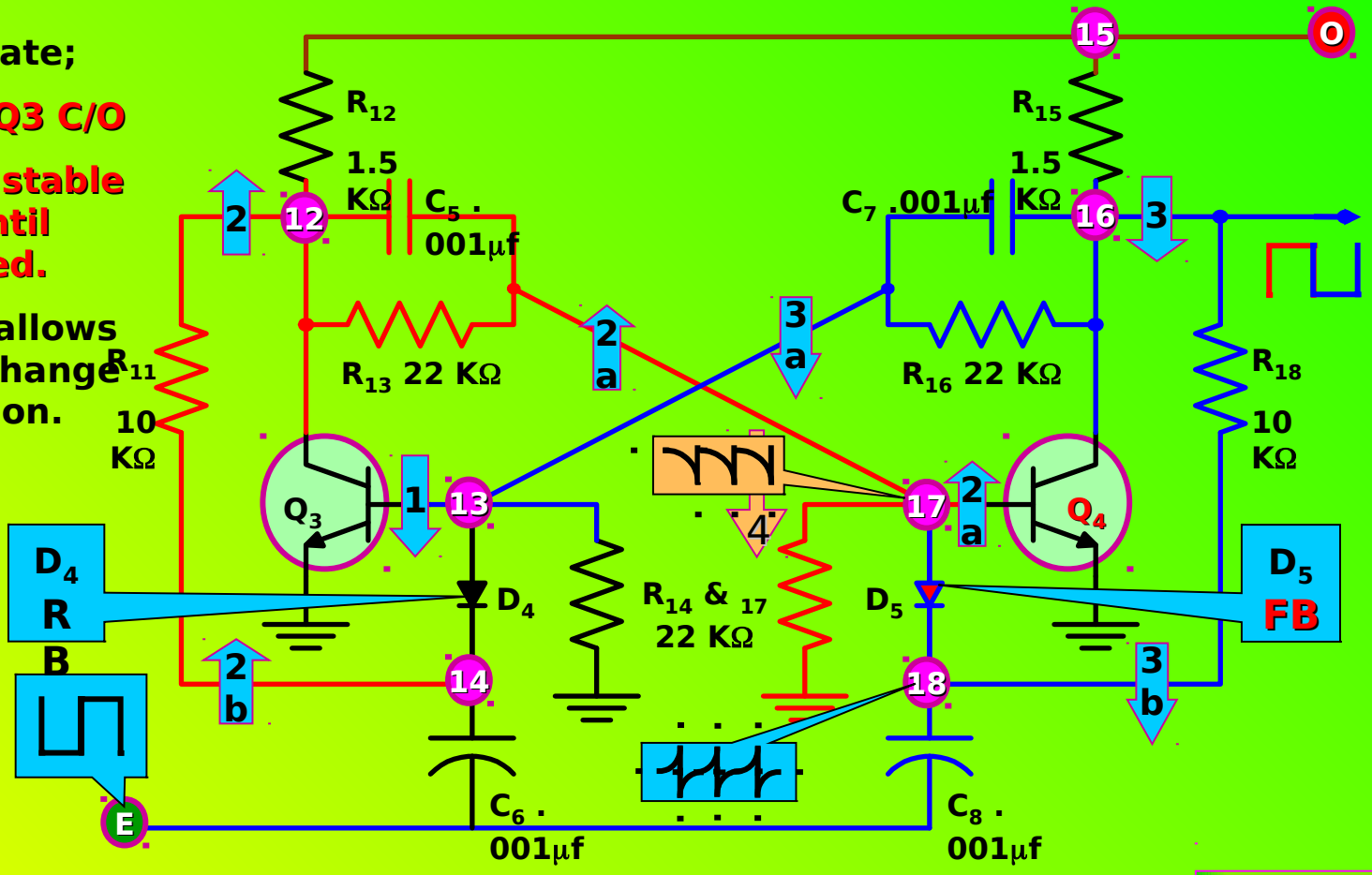
Bi Stable PC45: Ops, Q4 on Q3 off.

Stable State;

Q4 On, Q3 C/O

Remains in stable state until triggered.

D5 FB allows trigger to change conduction.



Frequency Out is ½ the Input.

Wave Form

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Bi Stable PC45: Wave Form Analysis @ TP 16

Stable State;

Q3 On, Q4 C/O

Remains in stable state until triggered.

D4 FB allows trigger to change conduction.

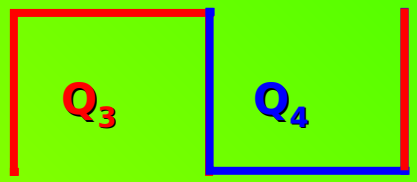
Stable State;

Q4 On, Q3 C/O

Remains in stable state until triggered.

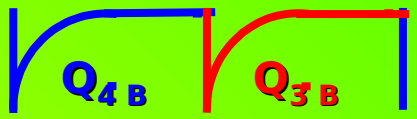
D5 FB allows trigger to change conduction.

Read Signals: Left to Right

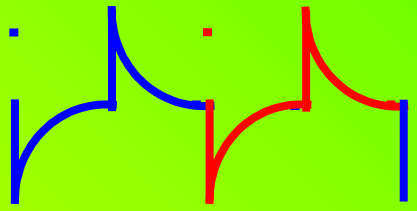


Output @ 220 KHz

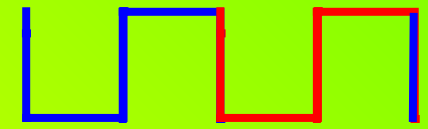
@ TP16



Rectified @ 220 KHz



Differentiated @ 440 KHz



Input @ 440 KHz

Frequency Out is ½ the Input.

Trouble Shoot

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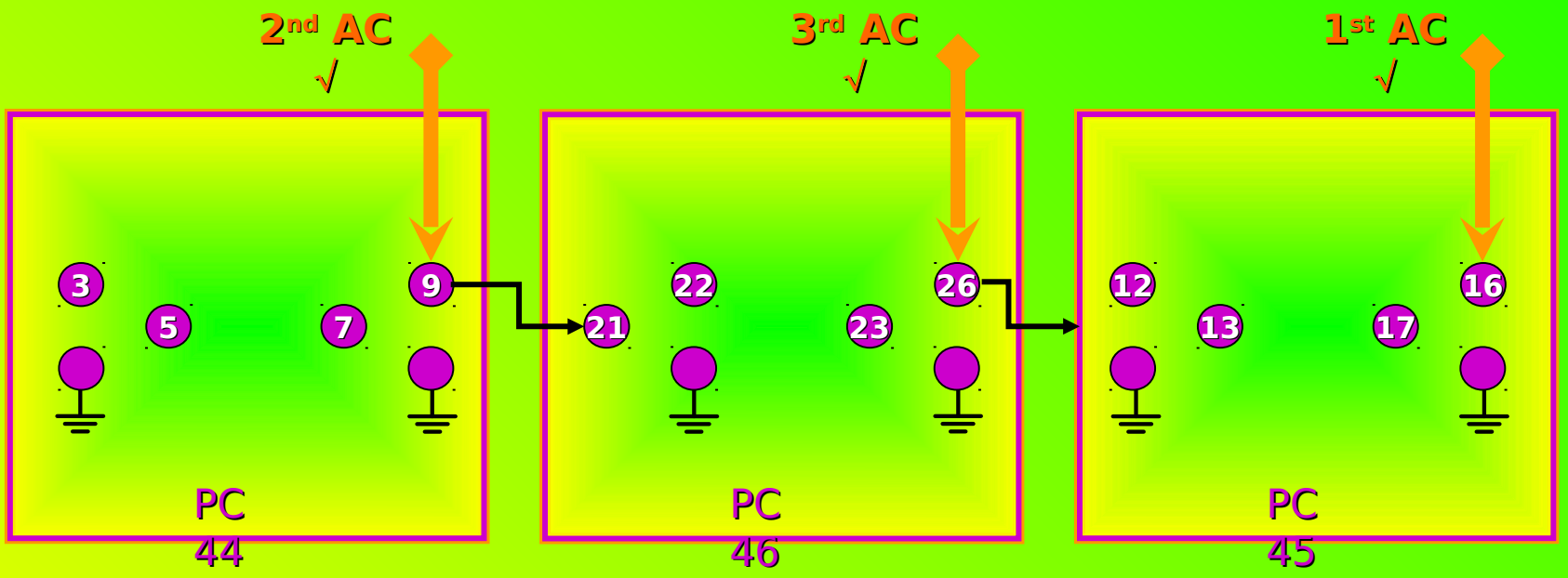
Trouble Shoot: PC 44, 46, 45. Locate Defective Card.



<u>Utilize ½ Split Method</u>, look for no signal, distorted signal or wrong frequency.

Ground Base

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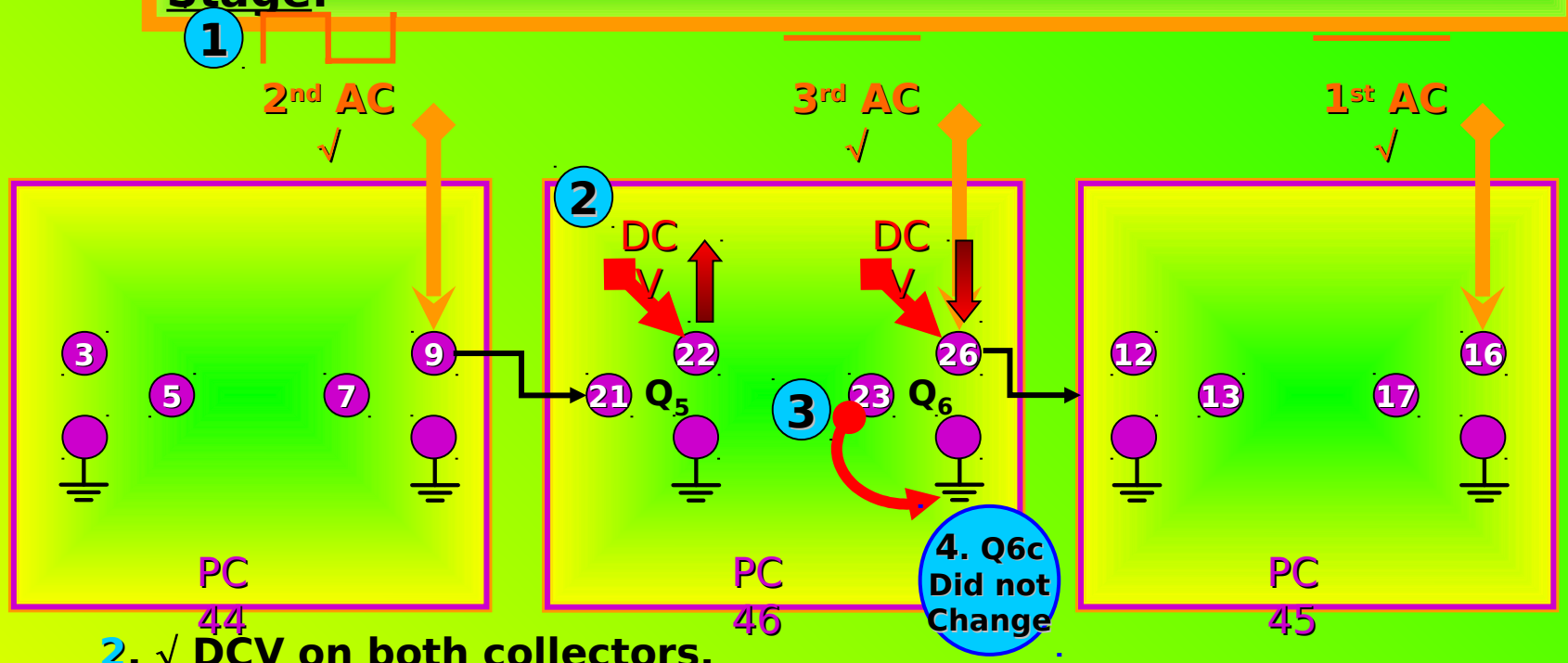
Trouble Shoot: PC 46 Defective Card. Locate the Stage.



2. √ DCV on both collectors.

3. GND the Base of the transistor w/the lowest Collector Voltage.

4. Re √ DCV on both collectors, the collector that Did Not Change is the defective transistor Stage.

Ground Base

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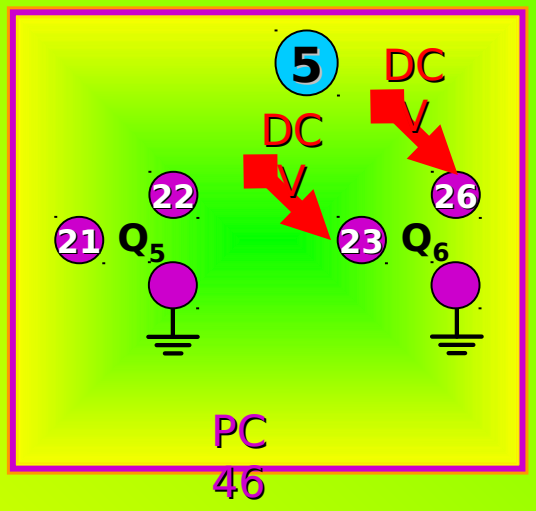
Trouble Shoot: PC 46 Card, Q6 Stage,



4. **REMOVE** Grounded Base Jumper Wire.

5. Do DCV √

6. Do Ohms confirmation √.

7. Record your results.

Ground Base Method

1. AC √s , Locate Defective Card.
2. √ DCV on both Collectors.
3. Gnd the Base of the transistor w/the lowest collector voltage.
4. Re √ DCV on both collectors.
5. The Collector W/DCV that Did Not change, that stage is malfunctioning.
6. Remove the Gnd jumper from the Base.
7. Do Normal DCV √s & Ohms Confirmation.

Review Questions

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Review Questions:

1. What does the term “Astable” mean? _____
2. Which components determine the “OFF” time of Q1 on PC 44 card. _____
3. What type of output is produced by the Astable multivibrator?
   a. Sawtooth
   b. Sinewave
   c. Squarewave
   d. Differentiated waveform
4. Which components determine the output frequency of the Astable multivibrator. _____
5. What is the phase relationship of the signal @ TP3 to that of the signal @ TP9 of PC 44? _____
6. How many stable conditions does PC 46 have? _____

Review Questions

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Review Questions:

7. In the stable state, what are the conditions of Q5 and Q6? _____
8. What determines the output frequency of the Monostable multivibrator. _____
9. With C10 open, what is the condition of Q5 & Q6 ? _____
10. With the Positive Pulse applied, what is the condition of Q5 & Q6 ? _____
11. Which components determines the pulse width produced by PC 46 ? _____
12. The Bistable multivibrator has _____ stable states or conditions.
13. Diodes CR4 & 5 are called _____ _____ when used in the Bistable multivibrator.
14. What effect does the Bistable multivibrator circuit have on the input frequency? _____
15. In order for CR4 to be forward biased, what must be the condition of Q4 ?

Review Questions

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Review Questions:

16. How many input triggers are required for one complete cycle of operation for PC45? _____

17. An Astable multivibrator is a form of _____

18 Refer to PC 44, what is the conduction level of Q1 & Q2 with Q2 Base open ? _____

19. What is the discharge path for C10 ? _____

20. Refer to PC 45; what would be the indication if Q4 was shorted collector to emitter?

    a. TP16 would be high

    b. TP17 would be high

    c. Q3 would saturate

    d. CR5 would be reverse biased

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Lesson Test:

Lesson Test:

Standard: 10 Questions W/in 20 Minutes. 70% Minimum Accuracy.

Reference: None.

PC 44, 46, 45

PE

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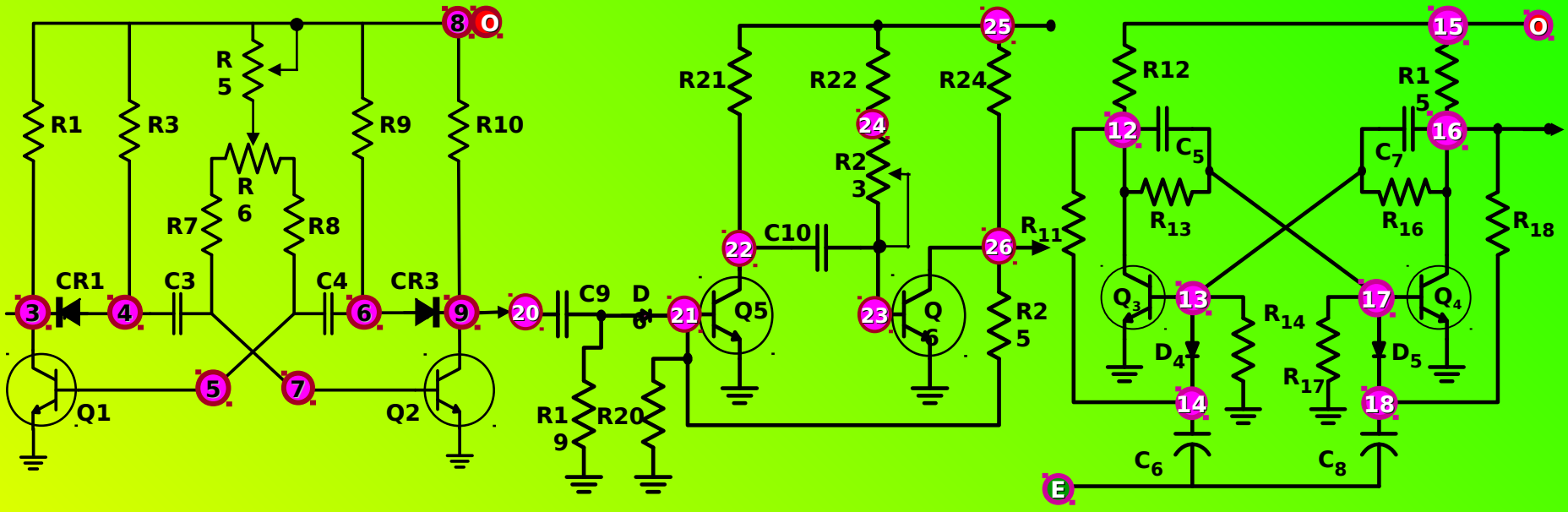
PC 44, 46, 45:



PE